If its form be that of a prolate spheroid with its poles equidistant from three of the axes, then those axes will be drawn as it were toward the poles and the lengths of these axes will be greater than of the other three. If the poles are midway between four of the axes, they will be similarly drawn together and elongated. If the molecule is an oblate spheroid, corresponding axes will be repelled and shortened. These cases will readily be seen to belong to the hexagonal, or rhombohedral, and the tetragonal systems; in the first two, with the vertical axis longer than the lateral, and in the last two, with the vertical shorter.

Some of the variations will not be regular or symmetrical, yet they may all be shown to correspond to some one of the six recognized crystallographic systems. The following table will indicate the possible variations and the systems into which they would fall, and also some other points. It is to be taken as suggestive rather than exhaustive.

Concerning hemihedral forms, we seem to obtain no more light from this conception than from the older view.

The apparent advantages resulting from this discussion may be briefly stated as follows:

1. It affords a rational explanation of the various phenomena and characteristics of crystals. Given equal and similar particles and simple attractions for each other, which attraction follows the laws conceived to govern gravitation, with the time and freedom for adjustment of particles in the most compact form, and crystals with constant angles and similar cleavage along similar planes, will necessarily result.

2. This recognition of the fundamental relation of the rhombic dodecahedron, which rests on mathematical principles, explains, also, why the kinds of symmetry found in crystals are only the two-, three-, four- and six-fold, for these are factors of twelve. We find why no five-, seven- or other fold will occur.

J. E. Todd

Lawrence, Kan.,
June 16, 1910

THE TWENTY-SECOND ANNUAL MEETING OF THE GEOLOGICAL SOCIETY OF AMERICA. II

The Upper Cayugan of Maryland: T. Poole Maynard, Atlanta, Ga. (Introduced by W. B. Clark.)

The Upper Cayugan of Maryland occurs in two well-defined areas in the western part of the state, the Hancock and Cumberland areas, and crosses the state in a northeast-southwest direction, following the general trend of the Appalachians. The rocks constituting the Upper Cayugan consist, usually, of argillaceous, thin-bedded limestones at the bottom, passing gradually into the heavier bedded limestones of the Lower Helderberg. These limestones lie between the Salina below and the Coeymans above and have an average thickness of one hundred and ten feet. There is only a gradual change in lithology from the Salina to the Coeymans and no well-defined lithological break exists. The upper and lower limits of the rocks constituting the Upper Cayugan are determined on paleontological grounds. These rocks, while equivalent in Maryland to the Manlius and Cobleskill of New York, can not be subdivided in Maryland on either paleontological or lithological grounds. The Rondout is absent in Maryland, while the fauna of the Cobleskill and Manlius are not distinct and separate as they are in New York, but they intermingle, typical New York Manlius and Cobleskill forms occurring together. They are also associated with forms occurring in the Upper Decker Ferry of New Jersey.

Discussed by A. W. Grabau.

Stratigraphic Relations of the Livingston Beds of Central Montana: R. W. Stone and W. R. Calvert, Washington, D. C. (Introduced by M. R. Campbell.)

The Livingston formation occurring at Livingston, Montana, has been described as resting unconformably on the Laramie and overlain by the Fort Union formation. Its age has been considered to be post-Laramie and it has been correlated with the Denver formation of Colorado, partly on lithologic similarity, both formations being composed largely of tufaceous beds. This paper showed that the Laramie of the Livingston and Little Belt Mountains folios of the Geologic Atlas of the United States is Eagle, or at least lower Montana, and that there is no unconformity between it and the overlying Livingston beds in the area under discussion. It showed also that on the west and south sides of the Crazy Mountains about 7,000 feet of sediments, mainly andesitic tuffs,

lying between the Eagle and Fort Union formations, constitute on lithologic grounds a single formation, but that on the north and east sides of the Crazy Mountains these same tufaceous beds are intercalated in the Colorado, Eagle, Claggett, Judith River, Bearpaw, "Laramie" and Fort Union formations. In other words, the Livingston has no formational value and has no definite age, for it represents volcanic activity which recurred throughout late Cretaceous and early Tertiary time.

Geologic Thermometry: FRED E. WRIGHT, Washington, D. C.

In ordinary thermometry, temperature is defined by the expansion of a perfect gas, and is expressed in terms of fixed units, determined by the freezing and boiling points of water under standard conditions. Temperatures are ascertained practically by means of thermometers which, although they differ greatly in type, are all based on some property which varies in a definite way with the temperature. In geology temperatures are of fundamental importance, particularly the temperature to which rocks were heated in past geologic ages and under inaccessible conditions. Points on the geologic thermometer scale must, therefore, be historical points, to be determined primarily by the permanent effects which such temperatures have produced on the rocks and rock components, and which are clearly marked even at lower temperatures. The factors which may serve to furnish points of this nature are, especially, melting temperatures of stable minerals and of eutectics, inversion temperatures of minerals, temperature limits beyond which monotropic forms can not exist under different conditions of pressure, also stability ranges of enantiotropic forms and of minerals which dissociate or decompose at higher temperatures, also temperatures beyond which certain optical or physical properties are changed permanently. These factors can be and are being determined by modern laboratory methods, and are in turn directly applicable to the study of rocks. The data now available on the geologic thermometer scale indicate that the establishment of such a scale is feasible, and can be accomplished by a sufficient number of proper laboratory determinations.

Discussed by J. F. Kemp, R. A. Daly, A. C. Lane and E. T. Wherry.

Some Mineral Relations from the Laboratory View-point: ARTHUR L. DAY, Washington, D. C. (Introduced by Fred E. Wright.)

The remarkable contributions which have been made to our knowledge of aqueous solutions since the formulation of the science of physical chemistry leave little doubt but that its generalizations can be applied with equal success to the study of rock formation. But the effort to make the application has brought us face to face with the fact that the problem of rock formation is of much broader scope and its phenomena are far more intricate than ever was imagined in the years when the first plans for laboratory work in the service of geology were made. This has had one conspicuous consequence. Most of the work done in the earlier years of laboratory experiment can not now be used to aid in the application of the new theories to mineral solutions. The first effect of this conclusion is to emphasize the necessity for widening our viewpoint to meet the increased scope which physical chemistry has imposed upon the study of mineral and rock formation from the magma, and the second, to compel us to revise our experimental methods so that the number of unknown factors will not outweigh the known and so prevent their intelligent interpretation and eventual application to geology. It is also necessary to recognize more explicitly the physical conditions affecting the problem upon its quantitative side. For example, we can not profitably continue to determine melting and solidifying points of natural minerals, and still less of complicated rocks, knowing that the addition of a small quantity of impurity almost always lowers a mineral melting point considerably, and knowing also that no mineral type occurring in nature is free from such impurities. We can not continue to observe melting temperatures by watching for the moment when the mineral begins to sag and run, knowing that in many most important minerals deformation does not occur until long after melting is over. We can not continue to ascribe individuality and characteristic properties to mineral glasses, knowing that they represent an unstable and undefined condition which may persist for months or years, or even for geologic time, without reaching equilibrium. At best, physical chemistry encounters this difficulty in considering both the natural minerals and the natural rocks—individual minerals do not occur in nature in uniform types, but are somewhat variable solid solutions with many minor ingredients; so too with the rocks we often find that equilibrium is not reached during the entire process of natural formation. It is difficult to

build a system of generalizations upon the properties of individuals which differ from their neighbors in any direction only in degree.

Discussed by A. C. Gill, Whitman Cross and the author.

Origin of the Alkaline Rocks: REGINALD A. DALY, Boston, Mass.

Most alkaline-rock bodies are associated with subalkaline (lime-alkali) types. The magmas from which alkaline rocks have originated have usually been erupted through limestones or other carbonate-bearing sediments. The thesis was then presented that the majority of the alkaline rocks have been derived from subalkaline (generally basaltic) magma through the absorption of limestone or dolomite by the magma. The solution of a relatively small proportion of the carbonate disturbs the chemical equilibrium of the subalkaline magma and its alkalies are concentrated in (generally the upper) part of the magma-chamber. According to conditions the concentration of the alkalies will vary in amount. The hypothesis explains the field associations, and the mineralogical and chemical compositions of most alkaline rocks.

Discussed by J. F. Kemp, Whitman Cross, H. P. Cushing, A. E. Barlow, W. G. Miller and the author.

The Complex of Alkaline Igneous Rocks at Cuttingsville, Vermont: J. W. EGGLESTON, Cambridge, Mass. (Introduced by J. E. Wolff.)

This is an oval area of alkaline igneous rocks, stock-like, with roughly concentric arrangement, and intrusive into gneisses. Syenite, with nepheline-bearing varieties is the chief type. There is also much essexite. The mass is cut by numerous dikes, including tinguaite and camptonite. In chemical character the rocks are closely related to those of southern Norway, described by Brögger.

Discussed by J. E. Wolff, F. E. Wright and J. A. Dresser.

Obsidian from Hrafntinnuhryggur, Iceland: FRED E. WRIGHT, Washington, D. C.

The paper described (*a*) peculiarly pitted surfaces on specimens of obsidian which resemble in a remarkable degree the markings of the Austrian moldavites; (*b*) also a unique type of crystallization in cavities in this obsidian.

Bleaching of Granite at Limestone Contacts: H. P. CUSHING, Cleveland, O.

In the Thousand Island region the red granite gneiss of Laurentian age invariably becomes white at limestone contacts and all the granitic dikes in the Grenville limestone are white. The color change does not take place, however, at the contacts with other Grenville sediments, either schists or quartzites, and the dikes in these rocks are red. Both the cause of the color change and the influence of the limestone in producing it are uncertain.

Pegmatite in the Granite of Quincy, Mass.: C. H. WARREN and C. PALACHE, Boston and Cambridge, Mass.

Only two important occurrences of pegmatite are known in the riebeckite granite of Quincy. These are exposed in two of the quarries and take the form of rudely cylindrical masses of considerable size entirely enclosed in the granite. In mineral composition they are closely similar to the granite, the essential minerals being quartz, alkali-feldspar, riebeckite and ægirine-augite; accessory minerals so far identified are fluorite, parisite, octahedrite, ilmenite, wulfenite and the sulphides molybdenite, galena, sphalerite and chalcopyrite. The pegmatites exhibit a certain symmetry of structure. Fine graphic-granite forms a marginal band, succeeded centrally by a zone of coarse granitic texture made up of quartz, feldspar, riebeckite and ægirine-augite. As a rule this zone graduates centrally into almost pure massive quartz, sometimes containing sulphides. In one portion of the largest mass the center is miarolitic and in the cavities thus formed the quartz, feldspar and ægirine-augite are well crystallized, while the rare minerals, noted above, find their principal development. Angular fragments of the pegmatite enclosed in felted crocidolite and deeply corroded crystals of riebeckite partly replaced by fluorite, point to a final stage of crushing and pneumatolytic action. The paper described these deposits and the minerals in detail.

Remarks were made by J. F. Kemp.

Fayalite in the Granite of Rockport, Mass.: CHARLES PALACHE, Cambridge, Mass.

A recent discovery of large crystals of fayalite in a granite pegmatite near Rockport furnishes for the first time opportunity for an accurate description of this interesting mineral occurrence, the mineral having been twice before found here, but in neither case studied in place.

Microscopic Study of Certain Coals in Relation to the Sapropelic Hypothesis: E. C. JEFFREY, Cambridge, Mass. (Introduced by David White.)

Discussed the ingredient matter and relation of the same to formation of cannels, kerosene

shales, bogheads, etc. Evidence against algal hypothesis as accounting for special characters.

Remarks by David White.

The Regional Devolatilization of Coal: DAVID WHITE, Washington, D. C.

Regional progressive devolatilization, which marks the second (dynamo-chemical) stage of coal formation, is due in most areas to deep-seated horizontal thrust pressure long continued. Essentially it is regional metamorphism, coal being a most sensitive index. Effects of loading and faulting. Comparison of effects of intrusives.

Discussed by J. F. Kemp.

Present and Future of Natural Gas Fields in the Northern Appalachians: F. G. CLAPP, Pittsburgh, Pa.

The waning natural-gas supply in some fields brings up the question as to the future of the natural-gas business. We must admit that the outlook is in some ways discouraging, but nevertheless the predominant indications are that new wells and new fields will continue to be found and to be productive for many years yet. During the past year there has been improvement and increase in the business and in the area of the productive fields in Pennsylvania and West Virginia. That the companies are not discouraged is evidenced by the fact that during 1909 the mains of the principal producers have been greatly extended. Cincinnati is now supplied, with every prospect that in another year Baltimore, Altoona and possibly Washington will have natural-gas mains. This paper described several new fields of interest, and their relation to the geological structure is summarized. Most of the shallow sand fields exhausted years ago have been recently replaced by adjacent new fields in deeper sands. In all cases yet examined by the writer, these fields bear a constant relation geologically to each other and to the structure.

Discussed by J. F. Kemp and F. R. Van Horn.

The following papers were presented by title:

Tide Water Glaciers of Prince William Sound and Kenai Peninsula, Alaska: U. S. GRANT, Evanston, Ill.

Eolation Under the Stimulus of Aridity: CHARLES R. KEYES, Des Moines, Iowa.

Glacial Lakes and Channels near Syracuse: T. C. HOPKINS, Syracuse, N. Y.

Glacial Investigations in the Lake Superior Region in 1909: FRANK LEVERETT, Ann Arbor, Mich.

Coon Butte; and Meteoritic Falls of the Desert: CHARLES R. KEYES, Des Moines, Iowa.

Bird's Hill, an Esker near Winnipeg, Manitoba: WARREN UPHAM, St. Paul, Minn.

The Red Sandstones of Southeastern Minnesota: C. W. HALL, Minneapolis, Minn.

The Magothy Formation of the Atlantic Coast: A. B. BIBBINS, Baltimore, Md.

Discovery of Fossils in the Quantico Slate Belt, and the Association of Volcano-sedimentary Beds with the Slates of the Virginia Crystalline Region: THOMAS L. WATSON, University of Virginia, and S. L. POWELL, Salem, Virginia.

Pleistocene Phenomena of Central Massachusetts: W. C. ALDEN, Washington, D. C.

Revision of Paleozoic Systems, II.: E. O. ULRICH, Washington, D. C.

Evidence that the Fossiliferous Gravel and Sand Beds of Iowa and Nebraska are Aftonian: B. SHIMEK, Iowa City, Iowa.

Note on a Method in Teaching Optical Mineralogy: F. W. MCNAIR. (Introduced by A. C. Lane.)

Pebbles: Types Formed by the Sea, Rivers, Wind and Glaciers: F. P. GULLIVER, Norwich, Conn.

Rhode Island Coal: CHARLES W. BROWN, Providence, R. I.

Preglacial Drainage of Central Western New York: A. W. GRABAU, New York, N. Y.

The Barite Deposits of Five Islands, N. S.: CHARLES H. WARREN, Boston, Mass.

Nelsonite, a New Rock-type: Its Occurrence, Association and Composition: THOMAS L. WATSON and STEPHEN TABER, University of Virginia.

The following officers were elected for 1910:

President—Arnold Hague, Washington, D. C.

First Vice-President—Charles Schuchert, New Haven, Conn.

Second Vice-President—A. P. Low, Ottawa, Canada.

Secretary—Edmund Otis Hovey, New York, N. Y.

Treasurer—William Bullock Clark, Baltimore, Md.

Editor—J. Stanley-Brown, Cold Spring Harbor, N. Y.

Librarian—H. P. Cushing, Cleveland, Ohio.

Councillors (1910–12)—J. B. Woodworth, Cambridge, Mass., and C. S. Prosser, Columbus, Ohio.

Fellows elected December 28, 1909—William Clinton Alden, Wallace Walter Atwood, Edson Sunderland Bastin, Edward Wilber Berry, Willis Stanley Blatchley, Henry Andrew Buehler, Fred Harvey Hall Calhoun, Arthur Louis Day, Frank Walbridge De Wolf, James Walter Goldthwait,

Baird Halberstadt, Oscar H. Hershey, Frederick Brewster Loomis, Richard Swann Lull, George Rogers Mansfield, Lawrence Martin, Samuel Washington McCallie, William John Miller, Malcolm John Munn, Edward Orton, Jr., Philip S. Smith, Warren Du Pré Smith, Cyrus Fisher Tolman, Jr., Charles Will Wright.

Correspondents elected December 28, 1909—Professor Charles Barrois, Lille, France; Professor W. C. Brögger, Christiania, Norway; Sir Archibald Geikie, Haslemere, England; Professor Albert Heim, Zürich, Switzerland; Professor Emanuel Kayser, Marburg, Germany; Professor Eduard Suess, Vienna, Austria; Professor Ferdinand Zirkel, Bonn, Germany.

The secretary announced the death during the past year of Persifor Frazer and Daniel W. Langton.

The report of the committee on the formation of the Paleontological Society was presented through its chairman, W. B. Clark, as follows:

"On February 13, 1909, at the American Museum of Natural History, New York City, your committee, composed of W. B. Clark, chairman, and Messrs. H. E. Gregory, J. M. Clarke and E. O. Hovey, C. W. Hayes being absent, met the organization committee of the Paleontological Society, consisting of Charles Schuchert, chairman, and Messrs. F. B. Loomis, David White and T. W. Stanton. Messrs. S. W. Williston and H. F. Osborn, of the Paleontological Society, were absent. The conferees went over the proposed constitution of the new society article by article, and finally adopted it in the form which was distributed to the fellows of the society in March, 1909.

"As organized, the Paleontological Society is a section of the Geological Society of America, in accordance with the expressed wish of the majority of paleontologists of the country, and only fellows of the Geological Society of America are eligible to fellowship in the Paleontological Society. Fellows of the Geological Society whose work is primarily in paleontology may become fellows of the Paleontological Society, on application to the council of the latter, without further payment of dues. Persons not fellows of the Geological Society who are engaged or interested in paleontological work may become members of the Paleontological Society by vote of the society on nomination by two fellows and approved by the council."

The council recommended the adoption of the following preamble and resolutions submitted by the American Philosophical Society:

"Whereas the United States in former years did much to increase our knowledge of the Antarctic regions, by means of the expedition of Lieutenant Charles Wilkes, U.S.N., and the voyages of American whalers, and

"Whereas there has been a great revival of interest in recent years in the South Polar regions, resulting in the despatching of scientific expeditions to explore portions of this area by England, Belgium, Sweden, Germany and France, and

"Whereas large areas in the far south will remain unexplored and many branches of science would be benefited by the sending of an American expedition to the far south, having for its object the reexploration of Wilkes Land and the collection of scientific data relating to regions visited, therefore be it

"*Resolved* that the Geological Society of America respectfully urges the federal government to consider the desirability of appropriating funds for the purpose of fitting out a suitable vessel, under the direction of the Secretary of the Navy, to undertake such exploration."

The first annual meeting of the Paleontological Society, organized under the arrangement noticed above, was held at Cambridge, Mass., December 29 and 30, 1909, and the following program was presented:

After the presidential address had been delivered by Dr. John M. Clarke, a "Conference on the Aspects of Paleontology" was held, at which papers on assigned topics were read by members of the Society by invitation of the council, as follows:

Adequacy of the Paleontologic Record: R. S. Bassler.

Interdependence of Stratigraphy and Paleontology: W. J. Sinclair and E. O. Ulrich.

Biologic Principles of Paleogeography: Charles Schuchert.

Paleontologic Evidences of Climate: T. W. Stanton and David White.

Migration: Henry S. Williams and Arthur Hollick.

Paleontologic Evidences of Adaptive Radiation: H. Fairfield Osborn.

Anatomy and Physiology in Extinct Organisms: Charles R. Eastman and Rudolph Ruedemann.

Contributions to Morphology from Paleontology: William Bullock Clark.

Embryology and Paleontology: Richard S. Lull and William H. Dall.

Ontogeny and Paleontology: F. B. LOOMIS and AMADEUS W. GRABAU.

Phylogeny and Paleontology: ROBERT T. JACKSON and D. P. PENHALLOW.

Paleontologic Evidences of Recapitulation: E. R. CUMINGS and L. HUSSAKOF.

Isolation in Paleontology: JOHN M. CLARKE.

Continuity of Development from the Paleontologic Standpoint: T. WAYLAND VAUGHAN.

Paleontology of Man: S. W. WILLISTON.

Varanosaurus Species: a Permian Pelycosaur: S. W. WILLISTON, Chicago, Ill.

Description with full illustrations of the complete skeleton of *Varanosaurus* sp., a primitive pelycosaur from the Permian of Texas; a slender crawling reptile, four feet in length. The specimens upon which the description is based were found almost perfectly preserved in a remarkable bone-bed associated with dozens of others of the same and related forms.

Discussed by H. F. Osborn, W. J. Sinclair and W. J. Holland.

The Structure of the Sauropod Dinosaurs: with special reference to the recent mounting of the skeleton of *Diplodocus carnegiei* Hatcher: W. J. HOLLAND, Pittsburgh, Pa.

This paper discussed certain recent criticisms of the work of Professors Marsh, Osborn, Lull, Hatcher and the writer in connection with the osteology of the sauropod dinosaurs.

Discussed by S. W. Williston.

Phylogenetic Position of the Genus Stegomylus: F. B. LOOMIS, Amherst, Mass.

The Armor of Stegosaurus: R. S. LULL, New Haven, Conn.

Discussed by H. F. Osborn and W. J. Holland.

Restoration of Paleolithic Man: R. S. LULL, New Haven, Conn.

New Genus of Permian Reptile: S. W. WILLISTON, Chicago, Ill.

Principal Character of the Chelydrosauria, a Suborder of Temnospondyte Amphibians from the Texas Permian: S. W. WILLISTON, Chicago, Ill.

Skull of Tyrannosaurus: H. F. OSBORN, New York, N. Y.

Anderson's Methods of Photography in Vertebrate Paleontology: H. F. OSBORN, New York, N. Y.

Correlation of the Pleistocene of Europe and America: H. F. OSBORN, New York, N. Y.

Permian Floras in the Western "Red Beds": DAVID WHITE, Washington, D. C.

Characteristic floras, found in a brief tentative search of red beds at three points in Colorado and New Mexico, not only prove Permian age but also indicate great thickness of Dyas in certain "Red Beds" sections in the Rocky Mountains. Examination of lower middle Wichita in Texas and additional collections from Chase (Wreford and Winfield beds) and Wellington of Kansas and from red beds within the same limits in Oklahoma, confirm lower Permian correlations.

Discussed by C. Schuchert, J. W. Beede, J. M. Clarke and E. O. Ulrich.

The Ordovicic-Siluric Section of the Mingan and Anticosti Islands, Gulf of St. Lawrence: CHARLES SCHUCHERT and W. T. TWENHOFEL, New Haven, Conn.

The section is a large one, beginning on the Mingan Islands in the lower Ordovicic and continued on Anticosti, where there is a complete transition from the Richmondian into the Clinton. The succession was described and correlations made with standard sections in the United States.

Discussed by E. O. Ulrich and A. W. Grabau.

On the Persistence of Fluctuating Variations, as Illustrated by the Genus Rhipidomella: HENRY S. WILLIAMS, Ithaca, N. Y.

A summary was given of results obtained from a comparison of measurements of a series of specimens of the brachiopod *Rhipidomella* from the Hamilton formation and from successive zones of recurrent Hamilton faunas in the upper Devonian of central New York, representing, probably, over a million years of the history of the genus; to which were added some remarks upon the bearing of the facts on the nature of organic variations.

Intracolonial Acceleration and Retardation, and its Bearing on Species: AMADEUS W. GRABAU, New York City.

Acceleration or tachygenesis and retardation, or bradygenesis, operate in differentiation of species by affecting either the entire individual (genepistasis), or only certain organs (heterepistasis), using these terms in a somewhat modified sense. These principles are applicable wherever it can be shown that development is orthogenetic. Intracolonial acceleration and retardation affect individuals within the colony so that they will either become more specialized in one or more determinable directions, or will remain in a more primitive stage of development than other members of the colony. Thus the colony will come to consist of individuals representing distinctly different steps in an orthogenetic series, *i. e.*, it will be multispecific. Examples from the invertebrates and from plants were cited.

The Fauna of the Girardeau Limestone and of the Edgewood Formation: T. E. SAVAGE, Urbana, Ill.

The Girardeau limestone is exposed over a small area in the southwestern part of Illinois and adjacent portions of Missouri. It consists of thin-bedded, fine-grained, dark-colored limestone, having a maximum thickness of thirty-five feet. The Edgewood formation rests unconformably upon the eroded surface of the Girardeau limestone. It outcrops in Illinois along the Mississippi River, north of the town of Thebes, where it has a total thickness of about thirteen feet. It is composed of a limestone conglomerate at the base, which is succeeded by a few feet of alternating shale and limestone layers followed by massive, coarse-grained limestone at the top. Twenty-seven species of fossils found in the Girardeau limestone and twenty-two species collected from the Edgewood formation are recorded. Ten of these are new. In these faunas are genera considered characteristic of the Silurian. Since the formations underlie strata in this region which correspond with the Clinton beds of Indiana and Ohio, they are referred to a position at the base of the Silurian, below the horizon of the Clinton.

The Phylogeny of Certain Cerithiidæ: ELVIRA WOOD, Waltham, Mass.

In order to determine the proper application of the term *Cerithium*, a genotype must be selected as a starting point. The ontogeny of this type gives a clue to the history of the phylum. By a comparison of ontogeny in recent and fossil forms the phylogeny of the group is worked out. By employing these standards *Cerithium* as now in use is shown to be a polyphyletic genus. With either *Cerithium nodulosum* or *C. tuberosum* as genotype a large number of species now classed with *Cerithium* may still be retained in that genus, and as thus restricted *Cerithium* becomes a monophyletic genus.

Mode of Life of the Eurypterida: JOHN M. CLARKE and RUDOLF RUEDEMANN, Albany, N. Y.

Deduced the life habits of these creatures from their anatomy and mode of occurrence.

A new Cystid from the Clinton Formation of Ontario: W. A. PARKS, Toronto, Canada.

In Vol. I. of the "Paleontology of Ohio" Meek describes *Lepocrinites moorei*. This form differs from all other cystids in having pectinirhombs on plates 15 and 10 in addition to the ordinary ones. Carpenter, Jaekel and Bather consider this feature of generic value. The priority of generic names rests with Carpenter (*Lepadocystis*). The new species described as *Lepadocystis clintonensis* differs in minor details only from the genotype. As Meek's description was based on a single specimen, we have in the present form the second specimen of the genus ever found, and also the type of a new species.

Some New Fossils from the Cambrian of South Attleboro, Mass.: W. B. HALL. (Introduced by R. S. Lull.)

Notes on the Upper Carboniferous in Southeastern New Mexico and Western Texas: G. B. RICHARDSON, Washington, D. C.

A number of sections were described and correlated. It was shown that the Upper Carboniferous in southeastern New Mexico and western Texas consists of a variable sequence of strata which are delimited above and below by major unconformities. The stratigraphic position of the disputed "Guadalupian" beds was also shown.

The Correlation of the Guadalupian and Kansas Sections: J. W. BEEDE, Bloomington, Ind.

The Guadalupian limestones of western Texas and southern New Mexico are overlain by the Pecos Valley Redbeds. These beds present the same lithologic features and are of similar succession as the Redbeds on the eastern side of the Llano Estacado and carry a fauna closely related to them. The gypsums appear to be the equivalents of the Greer gypsums as exposed in Oklahoma and Texas. If this correlation is correct, then the base of the Capitan limestone is on the same stratigraphic level, approximately, as the base of the Elmdale formation of Kansas and the base of the Guadalupian series on the level of the base of the Cherokee shales. The five thousand feet of Hueco beds would fall below this level.

The election of the following officers for the year 1910 was announced:

President—Charles Schuchert, New Haven, Conn.

First Vice-President—E. O. Ulrich, Washington, D. C.

Second Vice-President—S. W. Williston, Chicago, Ill.

Third Vice-President—F. H. Knowlton, Washington, D. C.

Secretary—Ray Smith Bassler.

Treasurer—W. D. Matthew, New York, N. Y.

Editor—Charles R. Eastman, Cambridge, Mass.

The next meeting of the Geological Society will be held at the Carnegie Museum, Pittsburgh, beginning Tuesday, December 27, 1910.

EDMUND OTIS HOVEY,
Secretary